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July 2, 2001

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Magalie R. Salas, Esq.
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

Re: CC Docket Nos. 00-251/& 00-218

In the Matter of Petition of AT&T Communications of Virginia, Inc., TCG Virginia, Inc., ACC National Telecom Corp., MediaOne of Virginia and MediaOne Telecommunications of Virginia, Inc. for Arbitration of an Interconnection Agreement With Verizon Virginia, Inc. Pursuant to Section 252(e)(5) of the Telecommunications Act of 1996

In the Matter of Petition of WorldCom, Inc., Pursuant to Section 252(e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration

Dear Ms. Salas:

On behalf of AT&T Communications of Virginia, Inc. and WorldCom, Inc. enclosed please find an original and three (3) copies of cost studies and supporting documentation setting forth the cost model outputs for Unbundled Network Elements and associated non-recurring charges. Also enclosed are three copies of the cost studies on CD-ROM discs. Additional discs are available upon request.

Thank you for your consideration in this matter.

Sincerely yours,

Allen N. Freifeld
for WorldCom, Inc.

Mark A. Keffer
for AT&T Communications
of Virginia, Inc.

cc: Service List
Enclosures

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**Before the
Federal Communications Commission
Washington, D.C. 20554**

JUL - 2 2001

**FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY**

**In the Matter of)
Petition of AT&T Communications)
of Virginia, Inc. Pursuant)
to Section 252(e)(5) of the)
Communications Act, for Preemption)
of the Jurisdiction of the Virginia)
State Corporation Commission)
Regarding Interconnection Disputes)
with Verizon-Virginia, Inc.)**

CC Docket No. 00-251

**In the Matter of)
Petition of WorldCom, Inc. Pursuant)
to Section 252(e)(5) of the)
Communications Act for Expedited)
Preemption of the Jurisdiction of the)
Virginia State Corporation Commission)
Regarding Interconnection Disputes)
with Verizon-Virginia, Inc., and for)
Expedited Arbitration)**

CC Docket No. 00-218

**COST STUDIES AND SUPPORTING DOCUMENTATION SETTING FORTH
COST MODEL OUTPUTS FOR UNBUNDLED NETWORK ELEMENTS AND
ASSOCIATED NON-RECURRING CHARGES SUBMITTED BY
AT&T COMMUNICATIONS OF VIRGINIA, INC. AND WORLDCOM, INC.**

VOLUME 1

COST MODEL-UNBUNDLED NETWORK ELEMENTS

Arbitration Cost Model Procedures

Rules 2.1.i and 3.1.c of the Commission's Procedures Established for Arbitration of Interconnection Agreements require that filings must include "[c]opies of all cost models, cost studies and other studies on which Petitioner [or Respondent] intends to rely to support its position and any documentation underlying those cost models, cost studies and other studies. Computerized cost models must be submitted in a form that allows the Arbitrator and the parties to alter inputs and determine the effect on cost estimates."

As set forth below, AT&T/WorldCom are submitting both the model on which it is relying and the underlying documentation. The submitted model allows the Arbitrator and the parties to alter inputs and determine the effect on cost estimates.

1. *All cost models and cost studies shall be submitted in a PC-based format.*

AT&T/WorldCom are submitting the original version of the FCC's Synthesis Model, as described in the Commission's *Tenth Report and Order* in CC Docket Nos. 96-45 and 97-160, *Federal-State Joint Board on Universal Service*, 14 FCC Record 20156 (released Nov. 2, 1999) ("Original Synthesis Model"), adjusted as described in the balance of this document.¹ Attachment A is a CD containing AT&T/WorldCom's filing of the Original Synthesis Model and the model documentation.

2. *Each party shall provide the following information for its cost model or cost study and other studies:*

A. *Hardware Requirements (i.e., disk space, memory requirements, etc.).*

AT&T/WorldCom recommend that the Original Synthesis Model be run on a Pentium Computer with at least 500 Mb of disk space and 128 Mb of RAM.

B. *Software Requirements (i.e., operating system and version, spreadsheet software and version).*

¹ The FCC released a beta version of a revised Synthesis Model earlier this month ("Updated Synthesis Model"), which has not yet been adopted and which AT&T/WorldCom have not yet had an opportunity to fully review. See http://www.fcc.gov/Bureaus/Common_Carrier/Notices/2001/da011458.doc and <http://www.fcc.gov/ccb/apd/hcpm>. AT&T/WorldCom reserve the right to rely upon the Updated Synthesis Model once they have had an opportunity to complete an in-depth review.

Pages 34-35 of the attached HCPM documentation describes the software requirements. Specifically, the documentation states:

The interface package is designed to operate under either a Windows 95/98 or a Windows NT operating environment, though the use of Windows NT is strongly recommended. The HCPM cluster module requires Microsoft Access to function correctly, and the HAI modules require both Microsoft Access and Microsoft Excel.

- C. *General Description: identification of the study or model (name and version, if appropriate); and a statement as to whether it is based upon (1) a generally recognized model (e.g., BCPM); (2) a study or model prepared by the submitting party; (3) a state study or model; or (4) other source.*

See response to item 1.

- D. *Supporting Information: information and documentation that begins with an overview of the basic approach taken in the cost model or cost study, including general methodology and basic assumptions. The supporting information and documentation shall also: (1) include a detailed description of the proposed cost model or cost study and all underlying data, formula, computations, and associated software, including a complete listing of algorithms and formulas used; (2) specifically identify each input value used for the study or model, and the cost and other assumptions upon which each unit value is based; (3) document and explain how such input assumptions satisfy the requirements that all prices be based upon forward-looking, economic costs and employ the least-cost, most efficient, and reasonable technology currently being deployed; and (4) identify the sources of all underlying data used in the study.*

Attachment B contains the documentation for the Original Synthesis Model, as it was originally provided by the FCC.

AT&T/WorldCom's submission makes four categories of changes to the Original Synthesis Model. First, certain implementation errors in the model were corrected,

including its optimization routines. These changes are briefly described in Subsection A below. Second, various inputs to the Original Synthesis Model have been updated to reflect more current information (the data in the FCC's Original Synthesis Model are for the year 1998). This process is described in Subsection B. Third, because the Synthesis Model was designed for use in establishing the Universal Service Fund ("USF"), certain modifications have been made to enable it to generate costs for UNEs. These modifications are described in Subsection C. Fourth, certain model inputs have been modified to reflect values more appropriate for Virginia. These are discussed in Subsection D.

A. Correction of Implementation Errors

AT&T/WorldCom's review of the Original Synthesis Model identified several errors in the way the model's algorithms implemented the principles espoused by the FCC staff. These errors misstated loop costs and have been corrected in the manner described below:

- **Drop Terminal Dispersion** - The Original Synthesis Model places drop terminals outside the microgrid to which they are assigned. The model has been modified to place the drop terminal locations appropriately.
- **Drop Terminal Orientation** - The Original Synthesis Model locates drop terminals for many customers at greater-than-optimal distances from serving SAIs. The model has been modified to place the drop terminals closer to the customers' serving SAI.

- Lot Size / Configuration - The Original Synthesis Model designs customer lots that exceed the lot size constraint established by the FCC Staff (*i.e.*, that a lot's depth should be between one and two times its width). The model has been corrected to comply with this constraint.
- Input Variables - The Original Synthesis Model does not always select the correct input for certain calculations. The model has been modified so that it associates each input with the correct variable.
- Residual Line Allocation - The Original Synthesis Model incorrectly rounds (*i.e.*, converts a fraction to the closest whole number) the lines per location, which causes the model to move lines from their originally established geographic location. The model has been modified to round the lines per microgrid (instead of rounding the lines per location), which more accurately represents the original customer location data.
- Node Selection Criteria - The Original Synthesis Model fails to use the appropriate criteria for connecting nodes in the modified Prim algorithm. Specifically, the model employs a cost-minimizing test, rather than a distance-minimizing test. However, the cost minimization routine works imperfectly, sometimes leading to inefficient results. The model has been modified to use the distance-minimizing criteria that more efficiently designs outside plant.
- Overlapping Microgrids - The Synthesis Model creates overlapping, populated microgrids between distinct clusters, thereby modeling too much outside plant. The model has been corrected to eliminate overlapping.

Attachment C identifies each individual change that has been made to the Original Synthesis Model's Turbo Pascal source code to implement these modifications.

B. Use of More Current Data

The Original Synthesis Model relies on 1998 ARMIS data, which are now three years old. Specifically, the Original Synthesis Model uses 1998 line counts, call completions and dial equipment minutes ("DEMs"). Verizon-VA has experienced growth in demand over the past several years, which is expected to continue through the period during which the rates established in this proceeding are likely to remain in effect. To avoid a timing mismatch between the vintage of the demand data and the applicable period for the rates, the inputs to the model for line counts, DEMs and call completions were modified to reflect actual growth in these variables from 1998 to the present, and estimated growth from the present to year-end 2002.²

In the standard run of the FCC's Original Synthesis Model, designed for USF purposes, common support services expenses are developed on a per-line basis. Specifically, the FCC relies on 1996, 1997 and 1998 data to estimate common support services expenses per line by performing a series of regression analyses for selected ARMIS accounts (6510: Other Property, Plant & Equipment; 6530: Network Operations; 6610: Marketing; 6620: Services Expense & Customer Operations; and 6700: Executive, Planning, General & Administrative). Data points for each regression are the total dollars in the account (dependent variable) and the number of switched lines, special access

² Attachment D shows how year-end 2002 demand was estimated. This time period was selected to reflect the appropriate mid-point of a three-year period during which the UNE rates established in this proceeding are likely to be in effect. Attachment E shows how ARMIS expense data was estimated for year-end 2002.

lines, and toll dial equipment minutes (independent variables) for each of 80 different companies.³ The Original Synthesis Model then uses the resulting regression coefficient for switched lines to develop a monthly per-line common support services expense that is applied entirely to the network interface device (“NID”). Several modifications are required to this approach to calculate the cost of UNEs. These modifications are described below in Subsection C.

C. Changes Required to The Common Support Services Calculation In Order to Use the Synthesis Model to Develop UNE Costs

Four modifications are required to adapt the FCC’s Original Synthesis Model to calculate the cost of UNEs. First, Verizon’s Virginia-specific expense data have been used with the FCC’s regression of 80 companies to generate more state-specific costs. The process of incorporating Verizon’s Virginia-specific expenses is included in Attachment E.

Second, common support services expenses used in USF calculations include retail-related costs that should be *excluded* in calculating TELRIC for UNEs. Therefore, the common support expenses associated with marketing and customer service and customer operations expenses should be removed.

Third, the Original Synthesis Model allocates total expenses for common support services to three services, *i.e.*, switched services, special access services, and toll services. Because USF applies only to switched services, the model properly excludes the common support expenses that it allocates to special access or toll services. In UNE

³ The FCC Staff actually divided each of the above data elements by total lines for each company before performing the regression analysis to develop per-line estimates.

proceedings, however, it is appropriate to take into account *all* common support expenses, because TELRIC focuses on elements that cut across a wide range of services. Therefore, it is necessary to include *all* common support expenses in applying the Original Synthesis Model in this proceeding.

Fourth, because the FCC designed the Original Synthesis Model for USF purposes, it includes the common support expenses (for switched services only) by assigning them, on a per-line basis, entirely to the NID. Because USF calculations look only at the *total* cost per line per month of providing basic local service, this cost allocation to the NID is merely a computational convenience. However, when using the Synthesis Model to develop the costs associated with individual UNEs, the costs of common support services must be allocated among *all* UNEs. The most straightforward way to accomplish this is to allocate total common support expenses to individual UNEs based on each UNE's proportion of direct costs.

In addition, AT&T and WorldCom have undertaken an analysis of the RBOC common overhead ratios and, on that basis, have concluded that an eight percent mark-up over direct expenses is an appropriate forward-looking assumption.⁴ Therefore, the per-line expenses for Executive, Planning, General & Administrative calculated by the FCC's regression have been eliminated, and an eight percent factor has been substituted.

⁴ The analysis supporting this assumption is included as Attachment F.

D. Modification of the Synthesis Model Run to Incorporate Certain Input Changes

AT&T and WorldCom have relied on the Original Synthesis Model input assumptions, as adopted by the FCC,⁵ except for the specific adjustments described below.

1. The cluster line fill factor has been increased from 80% to 90% to reflect a more appropriate DLC utilization rate;
2. The ratio of DS-1 lines-to-business lines has been changed from 12.75% to zero, and the percent of special access lines that are DS-1s has been changed from 91.75% to zero so that the model estimates investment for each line count input into the model;
3. The road distance factor has been reduced from 1.0 to 0.9 to help correct for the Original Synthesis Model's use of surrogate customer location data. Without this adjustment, the model exaggerates dispersion and inflates the amount of cable and structure actually required to connect Verizon-VA customers;
4. The structure mix percentages for distribution cable, copper feeder cable and fiber feeder cable were modified to reflect Verizon-VA-specific data;
5. Feeder structure costs were reduced by 40% to reflect sharing of feeder and distribution facilities;

⁵ Tenth Report and Order, Federal Communications Commission, CC Docket Nos. 96-45, 97-160, FCC 99-304, October 21, 1999.

6. Structure sharing inputs were changed to reflect more appropriate forward-looking values for Verizon-Virginia;
7. DLC inputs relating to line cards, equipment and site preparation costs were modified to reflect values more appropriate for Verizon-VA;
8. Three of the interoffice transport inputs were modified as described below:
 - Fiber cable costs were reduced from \$3.50 to \$1.80 to be consistent with the assumption of 24-strand fiber cable in the loop portion of the model;
 - Additional cost for buried cable has been eliminated because it is already included in the buried cable costs. Therefore, the separate input for buried sheet addition has been reduced from \$0.20 to zero;
 - Conduit material cost has been increased from \$0.60 to \$0.72 per foot to be consistent with the loop portion of the model;
9. The cost of capital assumptions in the Original Synthesis Model have been modified to reflect the relevant forward-looking risks and capital costs that Verizon is actually likely to experience in Virginia;
10. The corporate overhead factor has been adjusted from 0% to 8%, as described above;

11. The economic lives and net salvage percentages in the Original Synthesis Model have been modified to reflect more realistic forward-looking inputs for Verizon in Virginia.

Attachment G is a comparison of default Original Synthesis Model inputs and the revised inputs used for the Original Synthesis Model filing submitted in Attachment A.

E. Submissions Must Also Include A Spreadsheet Containing The Cost Model Or Cost Study's Outputs, i.e., The Resulting Price Of Each Matter At Issue.

Attachment H is a printout of the Original Synthesis Model output. Attachment I contains a summary table consisting of the cost-based price for each UNE based on the model filed in Attachment A.⁶ More detailed descriptions of two of these calculations are set forth below.

Calculation of Four-Wire Loop Cost from the Model's Two-Wire Loop Cost

Four-wire loop costs are derived from the Original Synthesis Model output for the two-wire loop (after incorporating the above modifications recommended by AT&T and WorldCom) by multiplying by a factor of 1.7. Moving from a two-wire to a four-wire loop affects the following component calculations:

- NID costs should be increased by a small factor to account for an additional overvoltage protector (estimated to cost \$4) in the existing NID;
- Distribution cost should be doubled to account for the second pair;

⁶ The two-wire loop costs shown in Attachment I are based on the nine density zones used in the Synthesis Model. AT&T/WorldCom will provide aggregated loop costs using the Virginia SCC's three density zones once Verizon provides the additional information needed for the calculation.

- SAI cost should be doubled;
- Copper feeder cost should be doubled;
- Fiber feeder cost should be unchanged. Because digital transmission is inherently four-wire, there is no increase in fiber feeder capacity required for four-wire loops;
- Because digital transmission is inherently four-wire, DLC common equipment cost should be unchanged. DLC channel unit investment will increase (estimated to double) for a four-wire loop. Thus, overall DLC costs are estimated to be approximately 40% higher for a four-wire loop than for a 2-wire loop.⁷

Development of DS-1 and DS-3 Costs from the Model Output

The Original Synthesis Model uses DS-0 equivalents, rather than physical line counts, as input. However, the filing in Attachment A modifies inputs for the ratio of DS-1 lines-to-business lines from 12.75% to zero and adjusts the percent of special access lines that are DS-1s from 91.75% to zero (as described above) in order to ensure that the DS-0 loop costs output by the model include the full cable investment required for a physical two-wire loop.

Calculating DS-1 and DS-3 costs from this output is a two-step process. First, the average number of DS-0 equivalents per physical line, for all non-switched lines, was

⁷ Attachment J illustrates the development of a 1.7 four-wire loop factor.

estimated to be approximately 8.0.⁸ Recognizing that non-switched lines include a mix of DS-1 and DS-3 services, a method of developing different DS-0 equivalent-to-physical line ratios for DS-1s and DS-3s was devised that reconciled to the overall 8-to-1 ratio. This required two assumptions. First, the calculation assumes a 9.6-to-1 ratio between the cost of a DS-3 and the cost of a DS-1, based on the FCC's determination in *In the Matter of Transport Rate Structure and Pricing*, FCC Docket 91-213, Third Memorandum, Opinion and Order, Released December 22, 1994, da940325, ¶¶ 62,63. Second, the calculations assume that 90 percent of the non-switched lines are DS-1s, and that 10 percent of the non-switched lines are DS-3s. These assumptions yield a DS-0 equivalent-to-physical line ratio of 4.3 for DS-1s, and a DS-0-equivalent-to-physical line ratio of 41.3 for DS-3s.

The calculations in Attachment I use these relationships to develop DS-1 and DS-3 costs from the Original Synthesis Model output. Because the DS-0 costs produced by the model already include line card costs that are affected by the 4.3 and 41.3 multipliers, no additional costs for electronics are included.

⁸ This estimate is based on estimated year-end 2002 ARMIS data for special access DS-0 equivalents (as reported in the 43-08 report) and private line loops (as reported in the 43-04 report).